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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/983,066	10/23/2001	Joo-Hyong Lee	1607-0257P	8895

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EXAMINER

PIZARRO CRESPO, MARCOS D

ART UNIT PAPER NUMBER

2814

DATE MAILED: 03/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/983,066

Applicant(s)

LEE ET AL.

Examiner

Marcos D. Pizarro-Crespo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 5) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Application/Control Number: 09/983,066 (Final Rejection)
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Attorney's Docket Number: 2332-0134P

Filing Date: 10/23/2001

Claimed Priority Dates: 1/21/2000 (Continuation 09/488,549)
1/22/1999 (KR 99-1909)

Applicant(s): Lee et al.

Examiner: Marcos D. Pizarro-Crespo

DETAILED ACTION

This Office action responds to the amendment in paper no. 7 filed on 2/10/2003.

Acknowledgment

1. The amendment in paper no. 7, filed on 2/10/2003, in response to the Office action in paper no. 5, mailed on 10/8/2002, has been entered. The present Office action is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 1-9.

Specification

2. A statement reading "This application is a continuation of application no. 09/488,549, filed on 1/20/2000, now abandoned." should be included in paragraph [001] of the specification.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to

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reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

5. Lines 1-2 of amended claim 7 recites the limitation "A semiconductor device comprising a homogeneous semiconductor substrate having a first conductivity-type". The description in the original disclosure fails to support this limitation in the claim. Several instances in the original specification describe a semiconductor substrate having the first conductivity-type (see, e.g., pp.1/ll.15, pp.3/ll.14, pp.6/ll.9-10,20; pp.8/ll.19-20; pp.14/ll.16-17). As defined by the applicants in paper no. 7 (see, e.g., pp.4-5), a homogeneous substrate has a uniform impurity concentration throughout its body. There is no mention whatsoever in the specification about a homogeneous substrate or a substrate having the impurity concentration profile defined by the applicants in paper no. 7.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1 and 3-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim (GB 2314974).

8. Kim shows (see, e.g., figs. 4A-4D) all aspects of the instant invention including a semiconductor device comprising:

- a homogenous semiconductor substrate **40** having a first conductivity type (*i.e.*, p-type)
- twin wells **43**, **45** formed in adjacent regions of a surface portion of the substrate **40**
- a first **43** of the twin wells having a second conductivity type (*i.e.*, n-type) formed in a first portion of the substrate **40** such that, in a direction of depth, a junction exists between the first twin well **43** and the substrate **40**
- a second **45** of the twin wells having the first conductivity type formed in a second portion of the substrate **40** such that, in a direction of depth, a junction exists between the second twin well **45** and the substrate **40**

wherein the substrate **40** has no buried implanted layer beneath the twin wells **43**, **45**, and the wells have a substantially uniform junction depth at substantially all points where the junction exists.

9. Regarding claims 3 and 4, Kim shows that there are three layers of ions included in the second twin well **45**, the three layers including lower and middle layers of a retrograde well and a threshold voltage layer at the surface of the well. See, *e.g.*, pp.15/II.27-pp.16/II.12.

10. Regarding claim 5, Kim shows that there are two layers of ions included in the first twin well **43**, the two layers including a lower layer of a retrograde well and a threshold voltage layer at the surface of the well. See, *e.g.*, pp.15/II.3-23.

11. Regarding claim 6, Kim shows that the twin wells **43**, **45** are symmetric about an axis perpendicular to the surface of the substrate **40** (see, *e.g.*, fig. 4B).

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12. Regarding claim 7, Kim shows the twin wells **43**, **45** having equal depths (see, e.g., fig. 4B).

13. Regarding claim 8, Kim shows the first twin well **43** extending to a predetermined depth in the substrate **40**, and increasing in a second conductivity-type impurity-ion concentration in the direction of depth. See, e.g., fig. 4B, pp.15/II.3-23.

14. Regarding claim 9, Kim shows the second twin well **45** extending to a predetermined depth in the substrate **40**, and increasing in a first conductivity-type impurity-ion concentration in the direction of depth. See, e.g., fig. 4B, pp.15/II.27-pp.16/II.12.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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17. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Takamura (US 5795803).

18. Kim shows most aspects of the instant invention (see paragraphs 8-14 above), but fails to show the wells having a junction depth of 1.5 μm . Nevertheless, depth differences are considered obvious design choices subject to routine experimentation and optimization and are not patentable unless unobvious or unexpected results are obtained.

Takamura (col.4/ll.49-52), for example, teaches that junction depths should be deeper than the bottom of device isolation regions. Takamura (col.4/ll.54-56) further teaches that the location of the junction can be adjusted by regulating the implantation energy of the impurity ions.

Therefore, it would be an obvious matter of design choice to select suitable junction depths for Kim's wells by merely adjusting the implantation energies of the impurity ions, as taught by Takamura, since junction depths are variables of importance subject to routine experimentation and optimization and it is not inventive to discover the workable ranges. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235.

Response to Arguments

19. The applicants argue:

Stolmeijer discloses a highly-doped substrate 2 and twin wells 5 and 6. Interposed between the wells and the highly-doped substrate is a lesser-doped substrate layer 3. Stolmeijer's twin wells are adjacent to the lesser-doped layer 3, which is an upper layer of substrate 2. Clearly then, Stolmeijer's substrate is not homogeneous. Consequently, Stolmeijer fails to disclose the homogeneous substrate recited in claim 1.

The examiner responds:

The description in the original disclosure fails to support the substrate as recited in amended claim 1. Claim 1 now recites a *homogeneous* substrate having a first conductivity type. Several instances in the original specification describe a semiconductor substrate having the first conductivity-type (see, e.g., pp.1/II.15; pp.3/II.14; pp.6/II.9-10,20; pp.8/II.19-20; and pp.14/II.16-17). According to applicants' argument above, a *homogeneous* substrate has a uniform impurity concentration throughout its body. There is no mention whatsoever in the specification about a *homogeneous* substrate or a substrate having the impurity concentration profile defined by the applicants.

20. All other arguments presented by the applicants have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

22. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

23. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

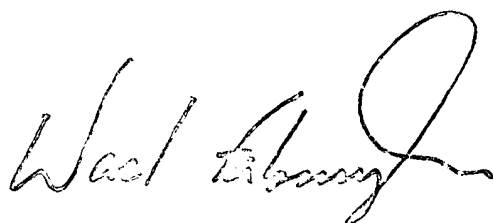
24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Marcos D. Pizarro-Crespo** at **(703) 308-6558** and between the hours of 9:30 AM to 8:00 PM (Eastern Standard Time) Monday through Thursday or by e-mail via Marcos.Pizarro@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (703) 308-4918.

25. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

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26. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/371; 438/223,224	2/28/2003
Other Documentation: PLUS Analysis	10/1/2002
Electronic Database(s): EAST (USPAT, EPO, JPO)	2/28/2003



SUPERVISORY PRIMARY EXAMINER
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